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Modularity and Tapers in Total Joint Replacement Devices

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Foreword

THIS COMPILATION OF Selected Technical Papers, *STP1591, Modularity and Tapers in Total Joint Replacement Devices*, contains peer-reviewed papers presented at a symposium held November 10, 2014, in New Orleans, LA, USA. The symposium was sponsored by ASTM International Committee F04 on Medical and Surgical Materials and Devices and Subcommittee F04.22 on Arthroplasty.

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Overview

The introduction of modularity in total joint replacement devices, most notably in the hip, has brought significant flexibility to the reconstructive surgeon when faced with complex musculoskeletal pathologies inclusive of biomechanical deficiency, deformity, and bone loss. These problems are not easily solved by monoblock devices in the primary and revision setting. Assembly of modular hip systems is accomplished through the use of interconnecting tapers, which have introduced challenges in terms of defining their in-vivo performance using preclinical, in vitro test methods. Topics of relevance to modular taper connections include structural damage; component disassembly; metallic debris; fretting, corrosion, and ion release. In some patients, material loss from modular tapers has been associated with adverse local tissue reactions as well as elevated chromium and cobalt serum levels in blood. It remains unclear why some patients exhibit a clinically significant reaction to the products of material loss from modular tapers, whereas others do not.

This ASTM special technical publication (STP) is an outgrowth of an ASTM symposium held on November 10, 2014, in New Orleans, Louisiana. The purpose of this symposium was to provide a forum for consensus development and scientific exchange on the needs for characterization and standardized testing related to modularity and tapers used in total joint replacement devices. The main focus of this symposium was to address unmet standardization needs and to help establish best testing practices in the following four areas:

- Characterization of fretting, corrosion and associated adverse tissue reactions
- What retrievals tell us in total joint arthroplasty
- Contemporary and evolving test methodologies
- Design parameters for taper connections in total joint arthroplasty

This STP contains 29 papers derived from both podium and poster presentations from clinicians and scientists whose goal was to provide contemporary insight into the evolving knowledge base of the tapered connections employed in modular joint replacement implant systems.

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